

WHAT IS CLAIMED IS:

1. A photomask, comprising:

a transparent substrate;

5 a first mask pattern disposed on a first region of the transparent substrate;

a second mask pattern disposed on a second region different from the first region of the transparent substrate; and

a transparent film provided on the first mask pattern, having an optical thickness configured to make a focal position
10 of the first mask pattern deeper than a focal position of the second mask pattern.

2. The photomask of claim 1, wherein the optical thickness determined by a product of an actual film thickness and a
15 refractive index of the transparent film corresponds to a systematic step generated on a surface of a working film due to a pattern density difference provided in a lower layer of the working film on a region where the first and second mask patterns are transferred.

20

3. The photomask of claim 2, wherein an absolute value of a difference between the optical thickness and the systematic step is less than or equal to an effective depth of focus of a projection optical system.

25

4. The photomask of claim 2, wherein the transparent film is

a composite film.

5. The photomask of claim 4, wherein an absolute value of a difference between a sum of the optical thickness of each
5 transparent film of the composite film and the systematic step is less than or equal to an effective depth of focus of a projection optical system.

6. The photomask of claim 1, wherein the transparent film
10 includes a resist film.

7. The photomask of claim 2, further comprising:
a third mask pattern disposed on another region of the transparent substrate; and
15 another transparent film having an optical thickness corresponding to another systematic step generated on the surface of the working film due to a pattern density in the lower layer of the working film on another region where the third mask pattern is transferred.

20

8. A method for fabricating a pattern, comprising:
coating a photoresist film above a working film covering an isolated pattern and a dense pattern provided above a substrate;
25 exposing the photoresist film through a photomask having first and second mask patterns and a transparent film provided

on the first mask pattern, the transparent film having an optical thickness configured to make a focal position of the first mask pattern deeper than a focal position of the second mask pattern; and

5 delineating first and second photoresist patterns by transferring the first and second mask patterns onto the photoresist film on regions corresponding to the isolated pattern and the dense pattern, respectively.

10 9. The method of claim 8, wherein a surface of the working film is polished prior to coating the photoresist film.

15 10. The method of claim 8, wherein the optical thickness is determined by a product of an actual film thickness and a refractive index of the transparent film corresponds to a systematic step generated on a surface of the working film due to a pattern density difference between the isolated pattern and the dense pattern.

20 11. The method of claim 10, wherein an absolute value of a difference between the optical thickness and the systematic step is less than or equal to an effective depth of focus of a projection optical system.

25 12. The method of claim 10, wherein the dense pattern includes first and second dense patterns having different pattern

densities, the second mask pattern of the photomask is transferred onto the photoresist film on a region corresponding to one of the first and second dense patterns having a higher pattern density, and the photomask further has a third mask
5 pattern to be transferred onto the photoresist film on a region corresponding to the other of the first and second dense patterns having a lower pattern density, and another transparent film having an optical thickness corresponding to another systematic step further generated on the surface of the working film due
10 to a pattern density difference between the first dense pattern and the second dense pattern, the another transparent film being provided on the third mask pattern.

13. The method of claim 12, wherein the another transparent
15 film is provided over the first and third mask patterns.

14. A method for manufacturing a semiconductor device, comprising:

depositing a working film above a semiconductor substrate,
20 a systematic step being generated on a surface of the working film due to a pattern density difference between an isolated pattern and a dense pattern fabricated above the semiconductor substrate;

coating a photoresist film above the working film;
25 exposing the photoresist film through a photomask having first and second mask patterns and a transparent film provided

on the first mask pattern, the transparent film having an optical thickness configured to make a focal position of the first mask pattern deeper than a focal position of the second mask pattern;

5 delineating first and second photoresist patterns by transferring the first and second mask patterns onto the photoresist film on regions corresponding to the isolated pattern and the dense pattern, respectively; and

processing the working film using the first and second photoresist patterns as masks.

10

15. The method of claim 14, further comprising, polishing the working film prior to coating the photoresist film.

15

16. The method of claim 14, wherein the optical thickness is determined by a product of an actual film thickness and a refractive index of the transparent film corresponds to the systematic step generated on the surface of the working film.

20

17. The method of claim 16, wherein an absolute value of a difference between the optical thickness and the systematic step is less than or equal to an effective depth of focus of a projection optical system.

25

18. The method of claim 16, wherein the dense pattern includes first and second dense patterns having different pattern densities, the second mask pattern of the photomask is

transferred onto the photoresist film on a region corresponding to one of the first and second dense patterns having a higher pattern density, and the photomask further has a third mask pattern to be transferred onto the photoresist film on a region
5 corresponding to the other of the first and second dense patterns having a lower pattern density, and another transparent film having an optical thickness corresponding to another systematic step further generated on the surface of the working film due to a pattern density difference between the first dense pattern
10 and the second dense pattern, the another transparent film being provided on the third mask pattern.

19. The method of claim 18, wherein the another transparent film is provided over the first and third mask patterns.

15

20. The method of claim 14, wherein the isolated pattern and the dense pattern are respectively formed in a logic pattern region and a memory pattern region merged on the semiconductor substrate.

20